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Auditor Tenure and Financial Reporting Fraud: Have the Relations Changed Post Sarbanes-Oxley Act of 2002?

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In this study, we investigated how auditor tenure and several related variables of the audit environment, such as the type of auditor (Big-N/other), audit firm tenure, client size, are related to the likelihood of fraudulent financial reporting. The study contributes to the debate on audit firm rotation. While PCAOB (2014) requires that public companies in the U.S. rotate their engagement partners every five years, there is no requirement to rotate audit firms, and there are mixed results in the extant literature on the relation between audit firm tenure and fraudulent financial reporting. For example, Knechel and Vanstraelen (2007) do not find any evidence that tenure is associated with an increase or decrease in audit quality but other researchers find that longer auditor tenure is associated with higher audit quality (e.g., Myers et al., 2003 and Geiger et al., 2002).

We use a large sample of over 6,000 fraud firm years spanning 1985–2015 matched with peer non-fraud clients to yield over 12,000 fraud and non-fraud firm years for our analysis.

While various indicators of audit quality have been used in the literature, we focus our study on fraudulent financial reporting because it carries the costliest consequence for stakeholders as it is likely to result in losses to shareholders and related losses to auditors (e.g., Kadous 2000; 2001).

The literature documents that short audit firm tenure (defined as three years or less) is positively related with lower quality audits (Stanley and DeZoort 2007; Gul et al., 2007) and financial reporting fraud (Carcelo and Nagy 2004).

The association between long auditor tenure and fraudulent financial reporting is more nuanced, thus we focus our research on that. We use four alternate definitions of long tenure (six, seven, eight, and nine years and longer, respectively).

We use a logistic regression in which the dependent variable is a binary variable which is one if a firm committed fraud, zero otherwise and the main independent variables are audit firm tenure in years, and binary measures of our long tenure definitions (i.e., six, seven, eight, and nine years or more respectively) to measure the likelihood of a firm to commit financial reporting fraud conditional on auditor tenure.

We find that while overall audit tenure is negatively associated with fraud, post-SOX, tenure is positively associated with fraud. We also find that none of the binary long audit tenure definitions is associated with fraud by itself, but post-SOX, long tenure of seven, eight, and nine years and longer respectively are negatively associated with fraud. When we define long tenure as six years or longer, it is not significantly associated with fraud post-SOX. Finally, we find a positive relation between client size and the likelihood of fraud, perhaps reflecting larger clients' bargaining power with auditors in contentious audit situations (cf., Nelson et al., 2002).

Our results suggest that efforts by the accounting profession to uncover fraud such as SOX and SAS 99, which requires brainstorming about potential fraudulent activities and became effective in December 2002 (AICPA 2002), may be making a difference, but it takes time for auditors to acquire the skills requisite to uncover fraud. This timing is because

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while post-SOX, tenure is positively associated with fraud, long tenure specifically defined as seven, eight, and nine years or longer are negatively associated with fraud post-SOX.[1]

The rest of the article is organized as follows. We review the literature and related hypotheses in the next section, followed by sections on research design and the related data. We present the results and provide a brief discussion and conclusions in the final sections.

Literature and Hypotheses

Auditor Size and Fraudulent Financial Reporting

The literature uses several proxies to gauge audit quality, including the type of auditor (Big-N or not) (e.g., DeAngelo 1981), the size of discretionary accruals (e.g., Johnson et al., 2002; Gul et al., 2007), financial restatements (e.g., Stanley and DeZoort 2007), and fraudulent financial reporting (e.g., Carcello and Nagy 2004). The SEC's Accounting and Auditing Enforcement Releases (AAERs) tend to be broader, covering financial disclosure violations that include fraud, non-fraudulent but reckless disclosure, and disputes that are neither fraudulent nor reckless (cf., Feroz, et al., 1991). Our study's focus is on firms that the Institute for Fraud Prevention (IFP) has identified as having engaged in fraudulent financial reporting.

Large audit firms generally, and Big-N auditors in particular, have been used as proxies for audit quality (e.g., DeAngelo 1981, Choi et al., 2010) and have been reported to be associated with higher quality audits when audit quality is measured by size of discretionary accruals (e.g., Myers et al., 2003) and restatements (e.g., Stanley and DeZoort 2007). The issue here is that discretionary accruals and restatements can sometimes be outcomes of fraud. Francis and Krishnan (1999) and Myers et al., 2003) find that large audit firms tend to be more conservative, limiting accruals more than their smaller audit firm counterparts. Furthermore, as parties with "deep pockets," thus big targets in lawsuits in case of an audit failure, Big-N auditors are likely to go to great lengths to prevent fraudulent financial reporting by their clients (e.g., Kadous 2000). Accordingly, we control for Big-N auditors and expect that these auditors are associated with lower likelihood of client fraudulent financial reporting than other auditors.

Auditor Specialization, Client Size and Fraudulent Financial Reporting

Industry specialist auditors are less associated with audit failure than non-specialists (e.g., Neal and Riley 2004; Knechel et al., 2007; Cenker and Nagy 2008; Gul et al., 2009). Knechel et al., (2007) find that clients that switched from a Big- 4 auditors to another that specialized in the client's industry experienced positive abnormal returns. Knechel et al., (2007) measure cumulative abnormal returns using the returns over the three days spanning the auditor switch date. They define abnormal returns as the excess returns over a size-matched portfolio. Cenker and Nagy (2008) find a negative relation between auditor industry specialization and auditor resignations.

Carcello and Nagy (2004) find that the negative relation between industry specialization and financial reporting fraud is weaker for larger clients, suggesting that larger clients are able to exploit their size to extract concessions from their auditors in contentious audit situations. For example, Nelson et al., (2002) indicate that auditors are less likely to require reversal of contentious income-increasing transactions for large clients than for small clients. Large clients also tend to make larger accruals (Myers et al., 2003). If accruals are the primary means of achieving fraudulent financial reporting and large clients are more able to resist auditors' efforts to reverse what seems like excessive accruals *ex ante*, then client size is likely to be positively related to fraudulent financial reporting. Thus, we control for client size and expect to find a positive association with fraud.

Long Audit Tenure and Fraudulent Financial Reporting

Occurrence of fraud in a client in itself does not necessarily imply poor audit quality but suggests it. Studies of the relationship between audit quality and auditor tenure in the U.S. face a self-selection bias because they are based on a regime of voluntary rotation (Casterella and Johnston 2013). In such a regime, audit firms may keep less risky clients and rotate out of more risky ones. This argument suggests that short tenure is associated with lower audit quality and long tenure with higher audit quality. Limiting our study to the fraud sample mitigates the self-selection problem as the auditors who would have preferred to rotate out of risky clients had yet to do so at the time of the fraud. Except for

[1] When we define long tenure as six years or longer, the period is not significantly associated with fraud post-SOX.

Carcello and Nagy (2004), prior studies have examined the relationship between fraud and auditor tenure using small samples.

Thus, while the relation between short auditor tenure and audit failure is relatively well-established in the literature, the relation between long auditor tenure and fraud is still unresolved. For example, while some researchers find that long tenure is negatively associated with reduced audit quality (e.g., Carey and Simnett 2006), Carcello and Nagy's (2004) results suggest that auditor tenure longer than eight years is not positively associated with the likelihood of fraud. Myers et al., (2003) find a negative relation between auditor tenure and discretionary accruals suggesting that tenure is positively associated with audit quality.[2] Therefore, how long tenure impacts audit quality is not clear. While long tenure can improve the expertise with client industry, apparently it also can increase economic dependence and with that an increased likelihood of reduced diligence in the audit.

Our hypotheses test the association between long auditor tenure and fraud, where long tenure is defined alternately as six, seven, eight, and nine years or more. We use greater than nine years and longer as our final cut-off because it the longest cut-off we have noticed in the literature. For example, it is the longest cutoff used in Carcelo and Nagy (2004). This longer tenure is further supported by the fact that the mean tenure in our data is about nine years.

H1: Long audit firm tenure does not influence the likelihood of fraudulent financial reporting by clients.

SOX (2002) and Fraudulent Financial Reporting

SOX (2002) changed the regulatory landscape for auditors and registrants alike, significantly tightening internal controls (cf., SOX 2002, Section 404), designed to reduce the likelihood of fraud and to improve audit quality. For example, post SOX (2002) auditors are found to be practicing with greater professional skepticism (Brown-Liburd et al., 2013; Cohen et al., 2010; Foster et al., 2010) than pre-SOX (2002). The heightened professional skepticism may result in more attention to the likelihood of client fraud irrespective of audit firm tenure. Furthermore, post SOX, audit partners are rotated every five years, potentially attenuating cozy relations between the engagement partner and client top management. This argument suggests that post SOX (2002) there is no association between long audit firm tenure and fraudulent financial reporting by their clients. Thus, we propose the following hypothesis:

H2: There is no association between *long* audit firm tenure and fraudulent financial reporting by audit clients post-SOX (2002).

Regarding medium-term tenure post-SOX, we have no expectation as to the nature of the association with fraud and so we pose a research question instead:

Q: What is the relation, if any, between auditor tenure and fraud post-SOX?

Research Design

We test our hypotheses and research question on estimations of various models based on Equation 1 (containing 1a to 1d) below:

$$FRAUD = \beta_0 + \beta_1\ TENURE + \beta_2\ POST\_SOX + \beta_3\ TENURE\ X\ POST\_SOX + \beta_4 SIZE + \beta_5 ZSCORE + \beta_6 BIGN + \beta_7 AGE + \beta_8 MKTBK + \beta_9 lONG\_TENURE\ X\ \ POST\_SOX + \beta_{10} IND + B_{11} YEAR + \varepsilon \quad (1)$$

Where*:

*Descriptive names in parentheses are used in the tables.

FRAUD	= one if a firm engaged in fraudulent financial reporting, zero otherwise
SIZE (ln(Assets))	= Natural log of Book value of assets
TENURE (ln(Tenure))	= Natural log of auditor tenure with the client in years
ZSCORE (Z-Score)	= Zmijiewski's score of financial distress
BIGN (Big-N Auditor)	= one for Big-N accounting firms, zero otherwise
AGE (ln(FirmAge))	= Natural log of age of the client
MKTBK (Market-to-book)	= Market-to-book ratio

[2] Myers et al., (2003) removed from their sample clients that had auditor tenure less than five years or greater than fifteen years.

LONG_TENURE (Long Tenure#)	= # is defined alternately as one if tenure is six, seven, eight, and nine years or longer, zero otherwise
POST_SOX (Post-SOX)	= one if the fraud occurred after passage of SOX (2002), zero otherwise
IND (Sector Fixed-Effects)	= Fama-French forty-eight industry classifications
YEAR	= Year Fixed-Effects

Fraud Sample and Variables

The Institute for Fraud Prevention (IFP) granted us access to a comprehensive database of audit clients that had engaged in fraudulent financial reporting. The IFP put together this unique database by examining the SEC's Litigation Releases to determine clients whose reporting issues involved fraud. The IFP then augmented this database with fraud clients identified by the SEC's Accounting and Auditing Enforcement Releases (AAER). The AAERs are akin to an initial enforcement action that the SEC is pursuing while the Litigation Releases are like outcomes of those actions. Across the initial full sample, the earliest year of fraudulent reporting is 1985 and the latest, 2015.

We obtain financial statement data such as total assets (SIZE) and those for estimating Zmijewski's Z-score from Compustat. We control for a firm's growth opportunities using market-to-book ratio (MKTBK). Growing clients may face more pressure from the capital markets to meet performance targets, increasing the incentive to commit fraud (e.g., Lie 2005; Efendi et al., 2007). Market value of equity data for calculating the market-to-book (MKTBK) ratio are from the CRSP database. Clients experiencing financial distress face incentives to commit fraudulent financial reporting. We measure the extent of financial distress a firm faces with Zmijewski's (1984) score (ZSCORE). Higher values of ZSCORE indicate greater financial distress which in turn can increase the pressure to commit fraud. Thus, we expect a positive coefficient on ZSCORE. We also obtain data on accounting firm tenure (TENURE) and whether the auditor is a Big-N auditor or not BIG-N from Compustat.

We control for phenomena peculiar to particular years by including year fixed effects. Similarly, we include industry fixed effects based on Fama-French forty-eight industry classification (Fama and French 1997).[3] The IFP data set provides a start and end date for the fraud.

While most of the firms had only one fraud event perpetrated over several years, the IFP data provided begin and end years of the fraud for each fraud per firm. We merged our fraud data set to Compustat and CRSP based on all fraud years, so that for each client, we collected all pertinent data for all applicable fraud years. After collecting all requisite data from Compustat and CRSP, we located a matched firm for each fraud firm using Fama-French's forty-eight industry classification, the firm's size (based on total assets) and year (the year the fraud started). Our initial sample had 882 fraud events and restricting it to those for which we had firm identifiers left us with 498 firms. These were then matched to non-fraud clients for all applicable fraud years spanning 1985 through 2015.[4]

Results

Descriptive Statistics

There are 12,363 firm year observations across both fraud and non-fraud firms, spanning forty-eight Fama-French industries from 1985 through 2015. Table I shows that the observations span a broad spectrum of the economy and Table II shows observations per year. There are 6,175 fraud firm-years and 6,188 non-fraud firm years. The slightly smaller observations for the more recent years may in part be because the SEC may still be conducting investigations. There is wide variability in the data. Though the sample sizes are close for each industry, they are not equal.[5] This factor is, in part, because we use all firm years during which fraud occurred (including the beginning and end dates). Thus, the

[3] Including both year and industry fixed effects is consistent in the literature (e.g. Myers et al., 2003). Also, leaving both controls out, including one and not the other, has the potential of generating noise in the results since we do not believe any of our independent variables is a "natural" proxy for industry or year.

[4] A matching non-fraudulent control firm is found by using the FASTCLUS procedure in SAS to find a match with the smallest Euclidean distance to a cluster of firms closest to the fraud firm on the variable of interest. The SAS FASTCLUS procedure uses disjoint cluster analysis where each fraud firm belongs to only one cluster.

[5] This fact should not pose a problem. For example, Carcello and Nagy (2004) run a logistic regression of fraud firms against a much larger sample of non-fraud firms in a sensitivity test.

matches are not one-to-one for all firm years. As a result, in some firm years there are more matches, and there are fewer matches in others.

After restricting the sample to firm-year observations for which there are data for all our variables of interest, our final sample is 11,191 firm-year observations. The average firm has assets of twenty-two billion dollars but the standard deviation is ninety-seven billion dollars (Table III). The clients in the sample are relatively young and skew toward growth clients. The average age is twenty years (standard deviation sixteen) and the mean market-to-book is 2.72. Mean and median auditor tenure are nine and six years respectively with a standard deviation of 8.3 years. The average firm in the sample is quite healthy, though with significant variability; the mean Zmijewski's Z-score of -.40 and the standard deviation 5.64 (Larger Z-scores signal poorer financial health). [see Tables I, II, and III, pg 770–772]

Table IV documents initial univariate comparison of key variables between fraud clients and their matched non-fraud peers. There are not significant differences in Z-score, age of the firm, and the proportion of auditors who are Big-N. There are significant differences in all other variables. For example, auditor tenure is 9.23 versus 8.8 for non-fraud and fraud clients respectively (p=.01). Correlations among the key variables are in Table V. Though the correlations among most variables are significant, except for the tenure variables, the correlations are quite small. Though ln(Tenure) and the binary Long Tenure# variables are highly correlated, the highest Variance Inflation Factor among the binary Long Tenure# and ln(Tenure) in all the models is less than 6.7, much less than the traditional ten for multicollinearity to be potential concern.[6] [see Tables IV and V, pg 773–774]

Multivariate Results

We estimate Model 1 to test for an association between length of auditor tenure and fraud. Those results are in Table VI. We define long tenure as ≥ six years in Model 1a, as ≥ seven years in Model 1b, ≥ eight years in Model 1c, and as ≥ nine years in Model 1d. Across all models we find no association between long tenure and fraud, supporting H1. However, contrary to our expectation that there will be no association between long tenure and fraud in a post-SOX environment (H2), we find that there is a negative association between long tenure and fraud when long tenure is defined as seven, eight, and nine years and longer respectively (Models 1b, 1c, and 1d in Table VI). Long Tenure# X Post-Sox (where # is seven, eight, and nine years) is negative and significant (all p-values < .05).

In the post-SOX environment, while long tenure is negatively associated with fraud, unconditional tenure (i.e., ln(Tenure) X Post-SOX) is positively associated with fraud (models 1b, 1c, and 1d) when we control for long tenure defined as ≥ seven, eight, and nine years, but not when we define long tenure as ≥ six years. The positive association between unconditional tenure and fraud post-SOX (ln(Tenure) X Post-SOX) is significantly positive in models 1b, 1c, and 1d) coupled with the negative association between long tenure and fraud post-SOX leaves the possibility that the positive association is attributable to medium tenure and / or short tenure.[7] Unconditional tenure across both pre- and post-fraud periods (i.e., ln(Tenure)) is negatively associated with fraud. [see Table VI, pg 775]

Sensitivity Test with Short Tenure

Prior research suggests that short auditor tenure is associated with fraud (Carcello and Nagy 2004) and lower audit quality (Johnson et al., 2002; Myers et al., 2003). To test if the positive association between tenure and fraud post-SOX is due to medium audit tenure, we control for short audit tenure. Short tenure is defined as three years or less and medium tenure, four to five years. The results are in Table VII. After controlling for short audit tenure in a post-SOX environment (Short Tenure X Post-SOX), auditor tenure is no longer positively associated with fraud. In(Tenure) X Post-SOX is no longer significant at conventional levels, though it is marginally significant in Model 3d (p <.10). These results suggest that the positive association between tenure and fraud post-SOX are likely driven more by short tenure than by medium tenure.

[6] The Post-SOX and Post-SOX X ln(Tenure) variables have high VIFs of ranging from the low teens to around twenty. We do not believe that this is an issue for two reasons. First, large VIFs, increase standard errors, reducing the chances of finding significant results. Second, multicollinearity are more likely to be problematic in small samples. Our large final sample size of 11,191 firm year observations should significantly diminishes this problem.

[7] The positive coefficient of Short Tenure (though insignificant) in the sensitivity test (Table VII), coupled with the negative coefficient of ln(Tenure) in Models 1b, 1c, and 1d (Table VI), and the negative coefficients on the binary variables of long tenures of seven, eight, and nine years interacted with post-SOX leaves short tenure as the likely driver of the positive coefficient of ln(Tenure) X Post-Sox in Table 6 for Models 1b, 1c, and 1d.

Also, after controlling for short tenure the negative association between ln(Tenure) and fraud is no longer significant, though the sign remains negative, while the sign of Short Tenure is positive (Table VII). Collectively, these results suggest that the negative association between fraud and unconditional tenure (i.e., ln(Tenure)) is more likely to be driven by medium term tenure than by short tenure, consistent with prior research that link short tenure with fraud or lower quality audits (e.g., DeZoort 2007; Gul et al., 2007). Interestingly, post SOX, short tenure is not a significant determinant of fraud (Short Tenure X Post-SOX is not significant across all models in Table VII), but long tenure greater than seven, eight, and nine years continue to be negatively associated with fraud post-SOX. [see Table VII, pg 776]

Consistent with prior research, we also find client size to be strongly associated with the likelihood of fraud, perhaps reflecting the bargaining power of large audit clients (Nelson et al., 2002). Nelson et al., find that auditors are more likely to acquiesce to client management on adjustments including earnings management reversals when the client is a large company. Client age (how long the client has been a public company) is marginally and negatively associated with fraud (e.g., Carcello and Nagy 2004).

Discussion

The absence of an association between the various definitions of long auditor tenure and fraud may in part be attributable to audit partner rotations. Audit partners are now rotated from clients after five years per PCAOB requirements. Similarly, the negative association between long auditor tenure of equal or greater than seven years and fraud post-SOX suggests that the SAS 99 requirements that auditors make a more deliberate effort to uncover fraud (AICPA 2002) and post-SOX efforts to maintain a professional arm's length relationship between auditor and client—such as audit partner rotations—may have borne some fruits.

Collectively the positive relation between post-SOX tenure (i.e., ln(Tenure) X Post-SOX in Table VI) and fraud coupled with the negative association between the various binary definitions of post-SOX long tenure (greater than seven, eight, and nine years respectively—for example, Long Tenure 7 X Post-SOX) and fraud (Tables VI and VII) suggests that while SOX and SAS 99 may help reduce financial reporting fraud, apparently it takes many years (at least seven according to this study) to start seeing a significant effect.

Our results contribute to the literature on audit tenure (e.g., Carcello and Nagy 2004) by documenting that the relationship between auditor tenure and fraud post-SOX is nuanced. While post-SOX tenure is associated with likelihood of fraud (ln(Tenure) X Post-Sox is positive in Table VI), our sensitivity tests suggest that this association is likely driven by short-term than by medium term tenure (TableVII) especially since the relation between long tenure of seven, eight, and nine years post-SOX and fraud is negative. This negative association is consistent with for example, Myers et al., (2003) and is like Geiger and Raghunandan (2002), who find more audit failures in the short audit tenures than long audit tenure.

By focusing on the post-SOX environment, this study implicitly evaluates if SOX may have had a mitigating effect on the likelihood of fraud. Our results suggest that long tenure of seven years and longer is associated with lower likelihood of fraud post-SOX. Since long tenure of seven years or longer by itself (i.e., not before SOX) is not associated with fraud, we can infer that SOX likely has contributed to long tenure reducing the likelihood of fraud.

Our results are tempered by the fact that we cannot completely rule out the possibility that part of our results are consequences of auditors holding on to the best clients and dumping problematic ones early on in their tenure. Research that investigates this auditor action can be fruitful. Research that attempts to establish an optimal range of years for the auditor-client relationship or studies very long tenured relationships (e.g., more than twenty years) also can be fruitful as it is difficult to make the case that an absence of a "term limit" on the relationship poses no threat to independence without empirical evidence.

A glance at the descriptions of the types of crimes in the IFP data suggests that they are diverse, including revenue recognition, expense understatement, and bribery. The following are but five descriptions of fraud randomly selected from the database along with the companies where the fraud occurred:

> "Overstate revenue"—Phar-More, Inc.
>
> "Failed to report stock options, compensation expense, improper gains for sale of loans"—Paragon Mortgage Corp.
>
> "Overstate revenues, and understate liabilities; capitalize expense."—Sulcus Hospitality Tech CP.

"Bribed government officials."—Dow Chemical

"Reported a fictitious audit."—Information Architects Corp.

Given the variability in the type of fraud, the systematic negative association between long auditor tenure and fraud post-SOX suggests that efforts by regulators to improve audit quality post-SOX are bearing positive results.

Conclusion

We compare a sample of audit clients that have committed fraud, with their peers that have not, based on industry, size, and the years in which the fraud activities occurred. We evaluate the association between auditor tenure and fraud with emphasis on the post-SOX period and find that long tenure greater than seven years is negatively associated with fraud, however, unconditional long tenure (i.e., tenure greater than or equal to six, seven, eight, and nine years) by itself is not associated with fraud.

Table I: Industry Composition

	Obs.
Agriculture	13
Food Products	269
Candy and Soda	62
Beer and Liquor	21
Tobacco Products	6
Recreation	75
Entertainment	175
Printing and Publishing	120
Consumer Goods	182
Apparel	226
Healthcare	225
Medical Equipment	341
Pharmaceutical Products	357
Chemicals	211
Rubber and Plastic Products	40
Textiles	60
Construction Materials	126
Construction	284
Steel Works Etc.	142
Fabricated Products	43
Machinery	505
Electrical Equipment	229
Automobiles and Trucks	199
Aircraft	75
Shipbuilding, Railroad Equipment	1
Defense	9
Precious Metals	13
Non-Metallic and Industrial Metal Mining	67
Petroleum and Natural Gas	249
Utilities	392
Communication	411
Personal Services	106
Business Services	1430
Computers	747
Electronic Equipment	987
Measuring and Control Equipment	202
Business Supplies	70
Shipping Containers	2
Transportation	116
Wholesale	631
Retail	661
Restaurants, Hotels, Motels	338
Insurance	477
Real Estate	64
Trading	298
Almost Nothing	226
Missing SIC Code	880
Total	12,363

Table II: Firm Year Observations per Year

	Fraud Sample Obs.	Control Sample Obs.
1985	114	136
1986	131	148
1987	138	159
1988	147	170
1989	153	176
1990	164	193
1991	181	207
1992	211	218
1993	231	233
1994	238	246
1995	256	264
1996	270	271
1997	275	275
1998	278	279
1999	277	271
2000	258	255
2001	239	238
2002	321	280
2003	292	254
2004	292	244
2005	261	214
2006	227	197
2007	186	178
2008	188	166
2009	175	170
2010	164	161
2011	121	133
2012	108	129
2013	102	121
2014	97	110
2015	80	92
Total	6,175	6,188

Table III: Descriptive Statistics

	Mean	1st Quartile	Median	3rd Quartile	Std. Dev.
Fraud	0.50	0.00	0.00	1.00	0.50
Assets (in mill.)	$21,644.56	$49.26	$461.47	$4,169.94	$97,190.19
ln(Assets)	6.17	3.90	6.14	8.34	3.06
Z-Score	-0.40	-2.36	-1.17	0.01	5.64
Big-N Auditor	0.65	0.00	1.00	1.00	0.48
Firm Age	20.37	7.00	16.00	30.00	15.97
ln(Firm Age)	2.62	1.95	2.77	3.40	1.01
Market-to-book	2.72	1.17	1.92	3.40	6.63
Tenure	9.03	3.00	6.00	13.00	8.30
ln(Tenure)	1.75	1.10	1.79	2.56	1.01
Long Tenure ≥ 6 Years	0.54	0.00	1.00	1.00	0.50
Long Tenure ≥ 7 Years	0.48	0.00	0.00	1.00	0.50
Long Tenure ≥ 8 Years	0.43	0.00	0.00	1.00	0.50
Long Tenure ≥ 9 Years	0.39	0.00	0.00	1.00	0.49
Post-SOX	0.36	0.00	0.00	1.00	0.48
N	12,363				

Table IV: Mean and Median Difference Tests

	Mean (Fraud Sample)	Mean (Control Sample)	p-value	Median (Fraud Sample)	Median (Control Sample)	p-value
Fraud	1.00	0.00	.	1.00	0.00	0.00
Assets (in mill.)	$27,214.35	$16128.04	0.00	$575.50	$389.77	0.00
ln(Assets)	$6.34	$6.00	0.00	$6.36	$5.97	0.00
Z-Score	-0.44	-0.35	0.37	-1.08	-1.28	0.00
Big-N Auditor	0.66	0.65	0.37	1.00	1.00	.
Firm Age	20.10	20.63	0.06	15.00	17.00	0.00
ln(Firm Age)	2.58	2.65	0.00	2.71	2.83	0.00
Market-to-book	2.77	2.68	0.44	1.99	1.87	0.00
Tenure	8.82	9.23	0.01	6.00	7.00	0.00
ln(Tenure)	1.71	1.79	0.00	1.79	1.95	0.00
Long Tenure ≥ 6 Years	0.52	0.56	0.00	1.00	1.00	.
Long Tenure ≥7 Years	0.46	0.50	0.00	0.00	1.00	0.00
Long Tenure ≥ 8 Years	0.41	0.45	0.00	0.00	0.00	0.00
Long Tenure ≥ 9 Years	0.37	0.41	0.00	0.00	0.00	0.00
Post-SOX	0.37	0.35	0.02	0.00	0.00	0.02
N	12,363					

Table V: Correlation of Primary Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
Fraud, 1	1												
Big-N Auditor, 2	0.01	1											
Firm Age, 3	-0.01	0.01	1										
Market-to-book, 4	0.01	0	-0.07**	1									
ln(Assets), 5	0.07**	0.18**	0.49**	-0.02*	1								
Z-Score, 6	0	-0.12**	-0.01	-0.11**	-0.19**	1							
Auditor Tenure, 7	-0.02*	0.06**	0.56**	-0.03**	0.38**	-0.03**	1						
Short Tenure, 8	0.04**	-0.09**	-0.27**	0.04**	-0.25**	0.02*	-0.56**	1					
Long Tenure6, 9	-0.04**	0.10**	0.36**	-0.06**	0.30**	-0.02**	0.69**	-0.72**	1				
Long Tenure7, 10	-0.04**	0.11**	0.39**	-0.06**	0.32**	-0.03**	0.73**	-0.64**	0.88**	1			
Long Tenure8, 11	-0.04**	0.11**	0.41**	-0.05**	0.32**	-0.03**	0.77**	-0.57**	0.80**	0.90**	1		
Long Tenure9, 12	-0.04**	0.11**	0.42**	-0.04**	0.33**	-0.04**	0.79**	-0.52**	0.73**	0.82**	0.91**	1	
Post-SOX, 13	0.03**	-0.09**	0.38**	-0.04**	0.31**	0.06**	0.27**	-0.17**	0.22**	0.22**	0.22**	0.22**	1

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Long Tenure# (where # = 7, 8, and 9) represent tenure ≥ 7, 8, and 9 years respectively.

Table VI: Logistic Regression of Fraud on Demarcations of Auditor Tenure (Long Tenure ≥ 6, 7, 8, & 9 years)

	Model 1a	Model 1b	Model 1c	Model 1d
Intercept	-0.709	-0.708	-0.688	-0.691
	(0.621)	(0.627)	(0.637)	(0.634)
ln(Tenure)	-0.124	-0.151**	-0.162**	-0.157**
	(0.115)	(0.026)	(0.010)	(0.012)
Post-SOX	-0.022	-0.075	-0.097	-0.117
	(0.952)	(0.839)	(0.793)	(0.748)
Ln(Tenure) X Post-SOX	0.158	0.241**	0.261**	0.259**
	(0.255)	(0.046)	(0.020)	(0.017)
ln(Assets)	0.087**	0.087**	0.087**	0.087**
	(0.033)	(0.033)	(0.034)	(0.035)
Z-Score	0.012	0.012	0.012	0.011
	(0.291)	(0.294)	(0.297)	(0.300)
Big-N Auditor	-0.066	-0.063	-0.059	-0.055
	(0.679)	(0.690)	(0.710)	(0.728)
ln(Firm Age)	-0.228*	-0.233*	-0.235*	-0.232*
	(0.078)	(0.072)	(0.071)	(0.073)
Market-to-book	0.001	0.001	0.001	0.001
	(0.877)	(0.884)	(0.880)	(0.885)
Long Tenure6	-0.001			
	(0.993)			
Long Tenure6 X Post-SOX	-0.238			
	(0.308)			
Long Tenure7		0.068		
		(0.478)		
Long Tenure7 X Post-SOX		-0.433**		
		(0.033)		
Long Tenure8			0.098	
			(0.333)	
Long Tenure8 X Post-SOX			-0.476**	
			(0.019)	
Long Tenure9				0.086
				(0.462)
Long Tenure9 X Post-SOX				-0.472**
				(0.030)
Sector & Year Fixed-Effects	Yes	Yes	Yes	Yes
N	11,191	11,191	11,191	11,191
Pseudo R-squared	0.040	0.040	0.040	0.040
Chi-Square	114.200	121.044	126.423	124.948

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Long Tenure# (where # = 6, 7, 8, and 9) represent tenure ≥ 6, 7, 8, and 9 years respectively.

Table VII: Logistic Regression of Fraud on Demarcations of Auditor Tenure (Control for Short Tenure)

	Model 2a	Model 2b	Model 2c	Model 2d
Intercept	-0.760	-0.750	-0.711	-0.709
	(0.600)	(0.610)	(0.628)	(0.628)
ln(Tenure)	-0.102	-0.128	-0.146	-0.140
	(0.366)	(0.242)	(0.155)	(0.125)
Post-SOX	0.097	-0.028	-0.144	-0.237
	(0.831)	(0.953)	(0.762)	(0.618)
Short Tenure	0.055	0.046	0.029	0.026
	(0.637)	(0.705)	(0.810)	(0.816)
Short Tenure X Post-SOX	-0.131	-0.045	0.056	0.129
	(0.551)	(0.853)	(0.828)	(0.621)
Ln(Tenure) X Post-SOX	0.121	0.219	0.277	0.310*
	(0.482)	(0.210)	(0.113)	(0.074)
ln(Assets)	0.087**	0.087**	0.087**	0.086**
	(0.033)	(0.033)	(0.034)	(0.035)
Z-Score	0.012	0.012	0.012	0.011
	(0.291)	(0.293)	(0.296)	(0.300)
Big-N Auditor	-0.064	-0.062	-0.059	-0.054
	(0.684)	(0.695)	(0.712)	(0.732)
ln(Firm Age)	-0.229*	-0.234*	-0.237*	-0.236*
	(0.076)	(0.071)	(0.068)	(0.069)
Market-to-book	0.001	0.001	0.001	0.001
	(0.874)	(0.886)	(0.890)	(0.903)
Long Tenure6	0.002			
	(0.980)			
Long Tenure6 X Post-SOX	-0.264			
	(0.200)			
Long Tenure7		0.061		
		(0.548)		
Long Tenure7 X Post-SOX		-0.426**		
		(0.032)		
Long Tenure8			0.091	
			(0.384)	
Long Tenure8 X Post-SOX			-0.481**	
			(0.023)	
Long Tenure9				0.079
				(0.487)
Long Tenure9 X Post-SOX				-0.504**
				(0.030)
Sector & Year Fixed-Effects	Yes	Yes	Yes	Yes
N	11191	11191	11191	11191
Pseudo R-squared	0.040	0.040	0.040	0.040
Chi-Square	121.400	126.412	127.180	124.982

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Long Tenure# (where # = 6, 7, 8, and 9) represent tenure ≥ 6, 7, 8, and 9 years respectively.

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